

Northwest RiverPartners

Dear Ms. Braley,

Please see that attached comments from Northwest RiverPartners and supporting documents.

Best regards,

Kurt Miller

Kurt Miller
Northwest RiverPartners
9817 Northeast 54th St, Suite 103
Vancouver, WA 98662

August 14, 2019

Ms. Susan Braley
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

RE: Comments on Proposed Rulemaking for Water Quality Standards for Surface Water of the State of Washington

Dear Ms. Braley:

Thank you for the opportunity to comment on behalf of Northwest RiverPartners (“RiverPartners”) regarding the Proposed Rulemaking for Revisions to Chapter 173-201A WAC, Water Quality Standards for Surface Water of the State of Washington. RiverPartners is an alliance of farmers, utilities, ports and businesses that promotes the economic and environmental benefits of the Columbia and Snake rivers; fish and wildlife policies and programs based on sound science; and clean, renewable, reliable hydropower. RiverPartners’ member organizations represent more than 4 million electric utility customers, 40,000 farmers, thousands of port employees, and large and small businesses that provide hundreds of thousands of Northwest jobs. The focus of this letter is Ecology’s consideration of amending the numeric criteria for total dissolved gas in the Snake and Columbia rivers (WAC 173-201A).

Description of Current Proposal

Per Ecology’s July 30, 2019 Proposal Notice:

The goal of this rule proposal is to improve fish passage for salmon and steelhead migrating downstream in the Snake and Columbia rivers. Dams release water through spillways over the dam and fish using the spillway have a better chance for survival compared to those that pass through the dams’ turbines. However, spilling water also increases TDG that can negatively impact aquatic life. This rule proposal would amend the TDG limit to allow for greater water flow through spillways for improved salmon migration, while ensuring that TDG limits minimize negative impacts to aquatic life through sufficient biological monitoring.¹

Specifically, these amendments would:

- “Provide a new adjusted TDG criteria that may be applied at dams that operate increased spills for the purpose of improving downstream juvenile salmon and steelhead migration in the Snake and Columbia rivers.”

¹ [7/30/2019 CR-102 form](#)

- “Establish biological thresholds that must be met to apply an adjusted criteria up to 125% TDG.”

Critical Considerations

The revisions must be part of a legally valid Endangered Species Act consultation. As Ecology acknowledges, the decision to explore a move to higher TDG levels comes from the 2019-2021 Spill Operation Agreement (“Spill Agreement”), which sought to create a “win-win for salmon, orca, and power generation.”² To ensure that Washington’s electricity customers are held harmless from Ecology’s proposed rule change, we were pleased to see language in the proposal that links compliance with the State standard to federal environmental standards such as those required by the Endangered Species Act (“ESA”). Specifically, we support retention of language in the proposal that requires the TDG criteria applied at dams operated by the U.S. Army Corps of Engineers to be in accordance with legally valid Endangered Species Act consultation documents on Columbia River system operations, including operations for fish passage. Without that accordance, spill could be increased without any consideration of customers, which would run counter to the spirit of the Spill Agreement, federal environmental mandates, and Ecology’s stated objectives.

Revisions should take into consideration Ecology’s findings from its 2009 TDG evaluation. Any changes in TDG standards should be based well supported science.

An important data point to flag as Ecology works to finalize this rulemaking, is that in the agency’s “Evaluation of the 115 Percent Total Dissolved Gas Forebay Requirement” document from 2009, Ecology stated:

“The weight of all the evidence from available scientific studies clearly points to detrimental effects on aquatic life near the surface when TDG approaches 120%. The detrimental effects ranged from behavior changes to high levels of mortality after a few days. There were fewer effects on aquatic life at 115% TDG. Ecology strongly encourages implementing actions that increase salmonid survival without further increasing total dissolved gas.”³

With this prior evaluation’s warning against TDG increases firmly in mind, it is important for Ecology to identify the science or information it has become aware of that would change its previous conclusion. If Ecology is not aware of new information or science that causes it to change its previous conclusion, then Ecology should consider a temporary rule waiver, instead of a change in the permanent rule to reduce the risk to aquatic life, until additional data become available.

Monitoring programs must include effects on adult fish. Under the proposed Amendatory Section of WAC 173-201A-200 reads:

Application of the tailrace maximum TDG criteria must be accompanied by a department approved biological monitoring plan designed to measure impacts of fish exposed to increased TDG conditions. Beginning in the year 2021, plans must include monitoring for nonsalmonid fish species and must continue for a minimum of five years, and thereafter as determined by the department.

RiverPartners is supportive of a robust monitoring program to be funded by the state that safeguards salmon and nonsalmonid fish from harmful TDG levels. We note also that it is critical that Washington’s monitoring

² [WA Dept. of Ecology News Release, 7-31-2019](#)

³ Adaptive Management Team Total Dissolved Gas in the Columbia and Snake Rivers: Evaluation of the 115 Percent Total Dissolved Gas Forebay Requirement. Washington State Department of Ecology and State of Oregon Department of Environmental Quality. January 2009, Publication no. 09-10-002. Page 60.

program not be merely applied to juveniles, but to adults as well. We note that for every 100 salmon smolts in the Columbia River Basin, roughly one or less successfully return to spawn as adults. Given the immense importance of the returning adults, they must be closely monitored to ensure their health is not being negatively affected by increased spill levels.

Also, the adult monitoring program should be applied to all impacts of increased spill—not merely on observed gas bubble trauma. As an example, the adult monitoring program should consider the increased upstream migration time and mortality that adult salmon are exposed to as a result of increased levels of spill. We note that this year, adult salmon were stalled repeatedly in their efforts to make it upstream past Little Goose Dam, due to increased spill levels. Correspondingly, Claire McGrath, of the National Oceanic and Atmospheric Association, presented the attached report to the US Army Corps of Engineers Technical Management Team Meeting on 7/10/2019. According to the TMT meeting minutes (attached), Ms. McGrath concluded, *...that despite varying results from the data tools, all of the indicators did consistently point to lower than expected conversion rates and slower travel times in the Lower Monumental to Little Goose reach. The 2019 YTD (as of 7/10) conversion of PIT-tagged adult Chinook from Lower Monumental to Little Goose was 96.2%, whereas the historical average for EOY conversion is 98.3%.⁴*

Given that spring Chinook are a culturally prized fish with the greatest biological value, and near their spawning grounds in this scenario, this lower conversion rate represents a significant reduction in survival.

Conclusion

RiverPartners advocates for the balanced use of rivers, for the benefit of communities and the environment. We are supportive of measures that have proven scientific benefit for salmon and that consider the effect that the decisions have on the many users of the river system.

With this mission in mind, we ask that Ecology maintain fidelity to the Spill Agreement principles upon which Ecology’s rule change proposal is based. It is critical that the three objectives outlined at the Spill Agreement’s outset are adhered to – provide additional spill for fish, manage power system costs, and preserve hydro system flexibility.

Further, we encourage Ecology to make sure that it is making the best scientific decision for salmon in its final conclusion and ensure adequate safeguards are in place for both juvenile and adult salmon.

Thank you again for the opportunity to comment. RiverPartners looks forward to working with Ecology throughout this and other key regulatory processes.

Best,



Kurt Miller
Executive Director, Northwest RiverPartners

⁴ [7/10/2019 Columbia River Technical Management Team Draft Facilitator’s Summary](#)

COLUMBIA RIVER TECHNICAL MANAGEMENT TEAM

July 10, 2019

DRAFT Facilitator’s Summary

Facilitator: Emily Stranz; Notes: Colby Mills

The following Facilitator’s Summary is intended to capture basic discussion, decisions, and actions, as well as point out future actions or issues that may need further discussion at upcoming meetings. These notes are not intended to be the “record” of the meeting, only a reminder for TMT members. Official minutes can be found on the TMT website: <http://www.nwdwc.usace.army.mil/tmt/agendas/2019/>.

Treaty Fishing

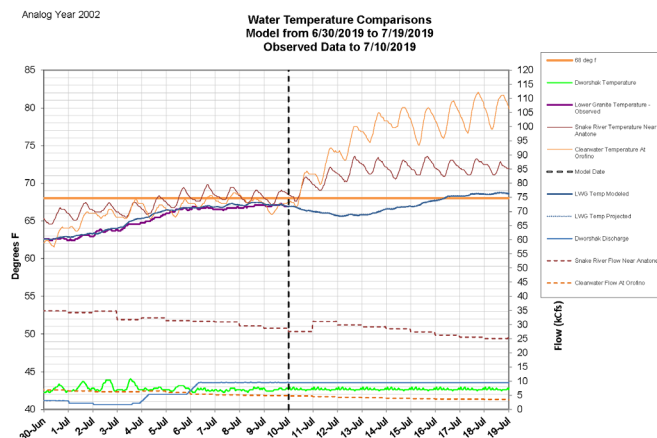
Doug Baus, Corps, updated the TMT on the summer treaty fishing extension (of SOR 2019-C1, 1.5 foot forebay operating range at Bonneville and The Dalles; 2.0 ft range at John Day) requested by CRITFC, which was implemented by the Corps on July 1-3 from 0600 to 1800 hours. This is expected to be the last treaty fishing for the summer fishery season.

Dworshak Operations

Jon Roberts, Corps, reported on current operations at Dworshak Dam. The project is discharging at full powerhouse of 9.5 kcfs (total of 9.6 kcfs, includes 100 cfs for hatchery) and has a pool elevation of 1,595.2 feet, with the reservoir continuing to draft as temperature flow augmentation continues (started July 6 at 0100 hours). The model is running each day with numerous scenarios.

TDG in the Dworshak tailrace and in the hatchery is currently about 98%, although there was a small spike to 104.5% in the tailrace on July 6 when a unit came back on. Levels have since come back down and stabilized, and are not expected to change until spill picks up at midnight tonight. Currently the Lower Granite tailwater is 66.72 degrees F, and the model shows that it will cool to the 66-degree F range with anticipated cold water arriving from Dworshak. The River Forecast Center shows minimal inflow into Dworshak, as the project will draft the reservoir consistently over the next month.

Temperatures continue to be in the 90-degree F range, and the 10-day weather forecast shows a spike in temperature on Saturday and Sunday with a cool down period early next week. The temperature model will run daily to monitor in case Dworshak’s discharges need to increase to not exceed 68 degrees F in the Lower Granite tailwater.



With temperatures forecasted to rise over the weekend, continuing at full powerhouse of 9.5 kcfs will very likely cause the Lower Granite tailwater to increase above the 68-degree F threshold, as seen in the modeled scenario with analog year 2002 (see graphic). Therefore, starting at midnight tonight, Dworshak will start spilling 3,000 cfs for 3 days, in addition to the full powerhouse, for a total discharge up to 12,500 cfs, to offset the increase in temperatures. The project will reduce spill and conserve water as soon as it is possible to maintain temperatures below 68 degrees F at the Lower Granite tailwater. As the end of the

10-day forecast from the temperature model can sometimes be uncertain, the model will be run and updated each day, and the TMT will be kept informed of any changes. Finally, Jon reminded the group that it takes 3-4 days for releases from Dworshak to affect Lower Granite temperatures.

Lower Monumental to Little Goose Dam

Claire McGrath, NOAA, provided a summary regarding adult spring Chinook conversion in the Lower Snake River. She reviewed the seasonal data collected using the DART PIT-tag tool and the FPC passage indicator tool. Data collected included, but were not limited to, passage timing; run timing; travel time; river conditions; conversion rates between Ice Harbor-Lower Granite Dams and Lower Monumental-Little Goose Dams; estimated fallback rates; and injury rates at Lower Granite. The complete summary is listed on the TMT website. Claire concluded that despite varying results from the data tools, all of the indicators did consistently point to lower than expected conversion rates and slower travel times in the Lower Monumental to Little Goose reach. The 2019 YTD (as of 7/10) conversion of PIT-tagged adult Chinook from Lower Monumental to Little Goose was 96.2%, whereas the historical average for EOY conversion is 98.3%. Claire noted that this issue along with operational analyses will be discussed in further detail at the 2019 TMT Year End Review meeting.

Little Goose Dam Forebay Operations

Aaron Marshall, Corps, updated the group on Little Goose Dam forebay operations. For the 2019 fish passage season, the Lower Snake River projects have been operating within a 1.5-foot minimum operating pool (MOP) range. The Little Goose forebay was raised by 1 foot (referred to as 1-foot raised MOP) on July 1 for purposes of navigation safety to maintain the minimum tailwater elevation at Lower Granite for the downstream navigation lock entrance. Little Goose MOP is a range from 633.0-634.5 feet, and 1-foot raised MOP is a range of 634.0-635.5 feet. The Corps expects the 1-foot raised MOP to continue for the rest of summer spill through the end of August.

At the other Lower Snake River projects, Lower Monumental Dam has been operating to a 0.5-foot raised MOP since June 12 for purposes of navigation safety. Lower Granite is continuing to operate in the variable MOP operation this year due to sedimentation around the Snake and Clearwater, and is currently operating to a 2-foot raised MOP range of 735.0-736.5 feet for flows below 50 kcfs. Ice Harbor Dam is currently operating within the normal 1.5-foot MOP range from 437.0-438.5 feet.

Lower Monumental Dam Operations

Doug updated the group on the error in spill patterns from the start of summer spill on June 21 at 0100 hours through June 28 at 1200 hours at Lower Monumental Dam, to which he notified the TMT on June 28 via email (posted on TMT website). The resulting uniform spill patterns implementation was due to human error, which has since been corrected. As of June 29, the project has returned to bulk spill patterns as described in the 2019 Fish Passage Plan.

**The next scheduled TMT meeting is a face-to-face meeting on July 17, 2019, at 9:00 AM.
A process meeting will follow for TMT Members.**

This summary is respectfully submitted by the DS Consulting Facilitation Team. Suggested edits are welcome and can be sent to Colby at colby@dsconsult.co.

Columbia River Regional Forum
Technical Management Team OFFICIAL MINUTES
July 10, 2019
Minutes: Melissa Haskin, FLUX Resources

Today's TMT meeting was chaired by Doug Baus, Corps, and facilitated by Emily Stranz, DS Consulting. See the end of these minutes for a list of today's attendees.

1. Treaty Fishing

Doug Baus, Corps, presented on the second and last treaty request for summer tribal fishing. The SOR the tribes submitted requested a 1.5 ft. operating range at The Dalles, John Day, and Bonneville from 0600 Monday, July 1 to 1800 Wednesday, July 3. The next SOR will likely be for fall fishing around August 19, 2019.

2. Dworshak Operations – Jon Roberts, Corps NWW

Jon Roberts, Corps, reported on operations at Dworshak Dam. The reservoir's current elevation is 1,595.92 ft. Temperature flow augmentation began on July 6 at 0100. The project is running on full powerhouse (discharging 9.5 kcfs) and 100 cfs is going to the hatchery for total project outflow of 9.6 kcfs. NWW is running temperature models each day.

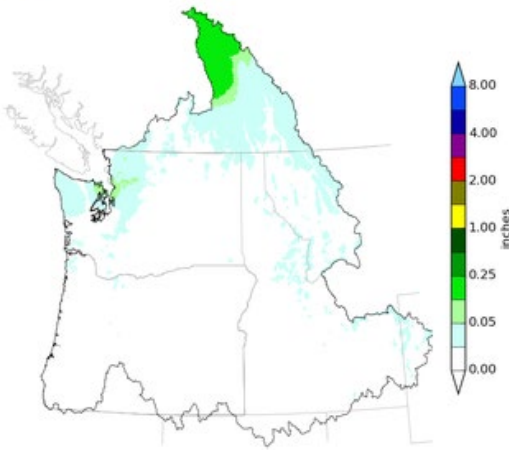
TDG is 98% at the Dworshak Dam tailrace. There was a recent spike to 104.5% TDG as the additional turbine was turned on at 0100 on July 6. It came down quickly and stabilized. The current TDG level is expected to remain steady until midnight when the project will begin spill.

The Lower Granite tailwater is currently 66.72 degrees Fahrenheit. Yesterday it was 67.23. The Corps NWW is anticipating that the temperatures will drop about half a degree to the 66 degree range as cool water from Dworshak Dam arrives.

Currently, there is minimal inflow into Dworshak Dam. The Corps will draft the reservoir pretty steadily over the next month and a half.

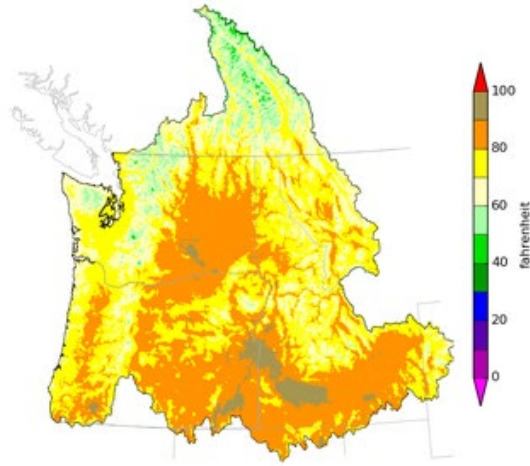
The 10-day forecast shows temperatures in the 90-degree range with a spike this weekend and a cool down Monday-Tuesday of next week.

Northwest River Forecast Center
DAY 10 QPF, 24hr Period Ending 12Z, 07/20/19



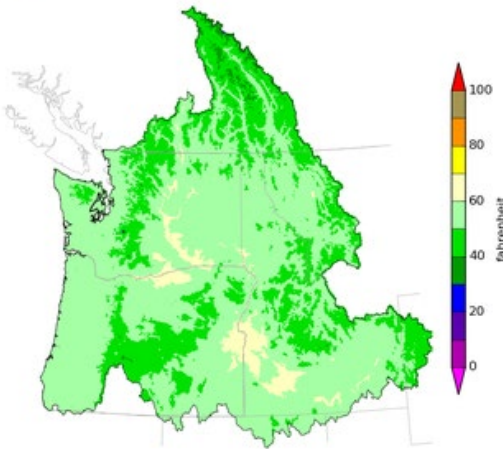
Creation Time: Wed Jul 10 21:43:44 UTC 2019

Northwest River Forecast Center
Forecast Max Temperature, Ending 04Z, 07/20/19



Creation Time: Wed Jul 10 15:07:03 UTC 2019

Northwest River Forecast Center
Forecast Min Temperature, Ending 17Z, 07/20/19

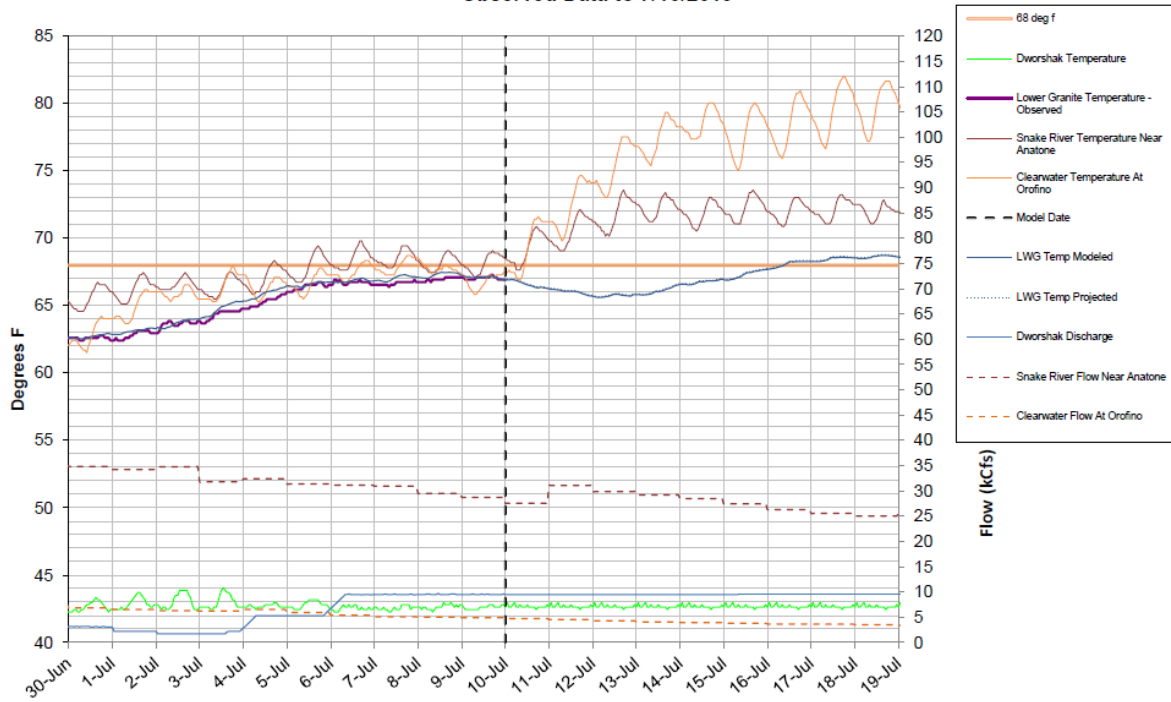


Creation Time: Wed Jul 10 15:07:29 UTC 2019

As noted, the Corps will start spilling 3 kcfs at midnight tonight to bring total project discharge to 12.5. It should take about 3 days for water to arrive at Lower Granite and 1 to 1.5 additional days for the results to be seen in the tailwater as shown in the second water temperature comparison graph (see below). If the Corps was to continue discharge at the current rate of full powerhouse, the Lower Granite tailwater would likely increase above 68 degrees, as shown in the first water temperature comparison graph. The Corps will continue discharging 12.5 kcfs for the next 3 days and then reevaluate. The goal is to decrease spill as soon as possible to conserve water.

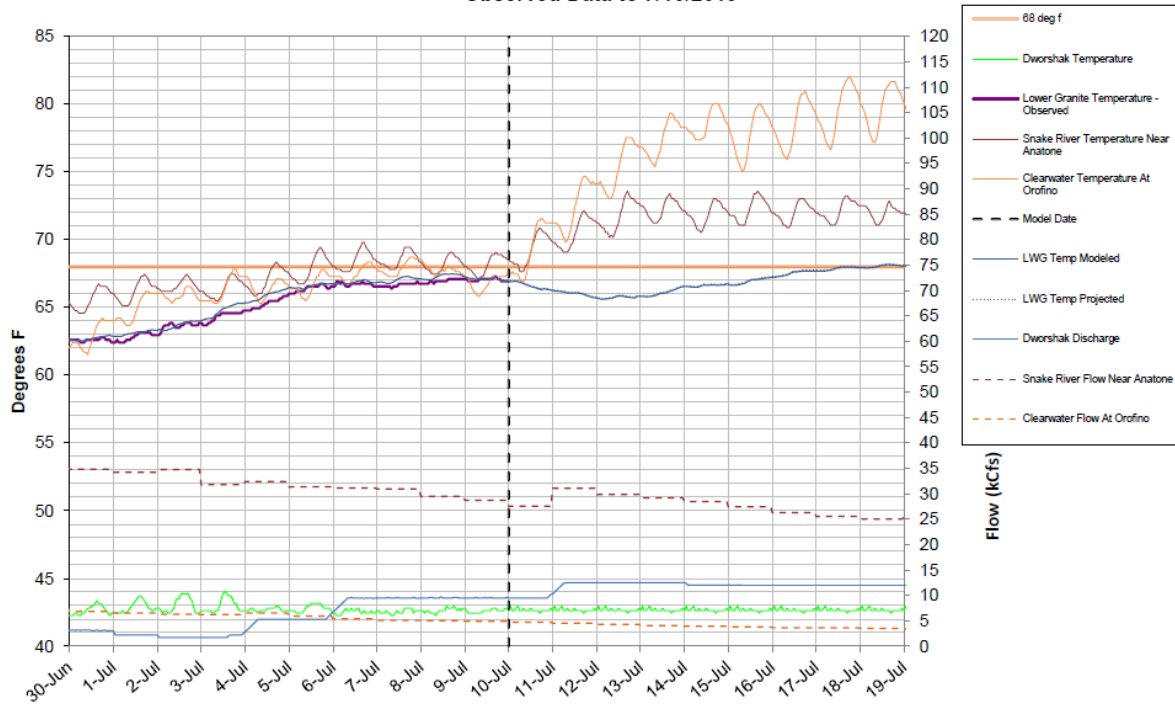
Analog Year 2002

Water Temperature Comparisons Model from 6/30/2019 to 7/19/2019 Observed Data to 7/10/2019



Analog Year 2002

Water Temperature Comparisons Model from 6/30/2019 to 7/19/2019 Observed Data to 7/10/2019



3. Lower Monumental to Little Goose Dam - Adult Spring Chinook Conversion - Claire McGrath, NOAA Fisheries

Claire McGrath, NOAA, reported on this year's adult spring Chinook conversion in the Lower Snake River, particularly from Lower Monumental to Little Goose Dam. Travel times this year were much longer than they have been historically. McGrath presented on overall passage and some of the indicators tracked this season. There will be a more in-depth presentation at the end of the year review in December.

McGrath shared a summary of the timing of 2019 Little Goose operations:

1. April 3 through May 24 (4:4 or 5:3 operation, per the Flex Spill Agreement)
2. May 25 through May 28 (6:2 operation)
3. May 29 through June 5 (8:0 operation)
4. June 6 through June 12 (8:0 with ASW high crest partial hrs)
5. June 13 through June 20 (8:0 with ASW high crest 24 hrs)

She shared graphs and data that showed when the operation was changed from a twice daily (am/pm) operation to a single morning operation, fish passage timing shifted as well from bimodal (am/pm) to unimodal (morning).

Both passage from Ice Harbor to Lower Granite and from Lower Monumental to Little Goose were well below historical end-of-year conversion. As of 7/9/2019, Ice Harbor to Lower Granite conversion is 94.3% (the historical average from 2006-2018 is 96.3%). Lower Monumental to Little Goose conversion through 7/9/19 is 96.2%, as opposed to a historical average of 98.3%.

DART showed 44% of dates between May 8 and June 20 as potential delay days from Ice Harbor to Lower Granite. From Lower Monumental to Little Goose, potential delay days were much higher at 70% between May 9 and June 20.

A question often raised at TMT is whether conversion rates are different between wild and hatchery fish. McGrath reported that, based on available data, wild-origin adult Chinook had lower conversion from Lower Monumental to Little Goose (93%) than hatchery fish (96%).

FPC data also showed lower conversion and longer than expected travel times between Lower Monumental and Little Goose for much of the 2019 spring spill season.

However, McGrath noted that when you look at the overall picture from Ice Harbor to Lower Granite timing is a little late but not too far off from average. This is because timing between the other projects is closer to average and helps even out the overall timing, even with

passage between Lower Monumental and Little Goose longer than average. In fact, once the fish pass Little Goose, they tend to pick up speed, noted McGrath.

McGrath showed a summary of fallback rates:

	May 1 – 28	May 29 - June 20	2019 Average
Ice Harbor	7.3%	3.3%	5.4%
Lower Monumental	6.4%	2.8%	4.6%
Little Goose	13.3%	5.9%	9.6%
Lower Granite	6.9%	9.1%	8.1%

Concern was raised that jaw damage and head burn were observed at higher than normal rates this spring. McGrath did a quick investigation of this and found that there were about 5.2% jaw injuries this year. It’s hard to tell if this is unusual because there is only one other year of data. Head burn came in at 2.1%, which seems in line with previous years. McGrath will provide more information on this at the year-end review.

Erick Van Dyke, OR, pointed out that the operations above MOP were lumped in to the 8-hour 30% spill operation. McGrath said it should not be an issue since she was looking at the fish below the project so forebay elevation should not have an impact. This may be discussed more at the year-end review.

As a reminder, this was a preliminary review and the information will be further investigated and discussed at the year-end review.

Baus asked if this type of information would also be available for juveniles. McGrath said it is on their minds but they have not begun any work. McGrath said there may be other analyses from other TMT representatives available. Russ Kiefer, ID, said that the FPC is working on a PIT-PH analysis and will get the NOAA transport estimates, travel times, and survival rates for the year-end review.

4. Forebay Operations - Aaron Marshall, Corps NWD

Aaron Marshall, Corps, reminded TMT that the Lower Snake projects are operating in a 1.5-ft. MOP range during the 2019 fish passage season. At Little Goose, on July, 1, MOP was raised by 1 ft to 634.0-635.5 ft for navigation safety to maintain the minimum tailwater for the downstream lock entrance at Lower Granite. The operation should continue through August.

Lower Monumental has been operating in a 0.5-ft. raised MOP since June 12 for navigation safety to maintain the minimum depth at the Little Goose downstream lock entrance.

Lower Granite continuing the variable MOP operation due to sedimentation around the confluence of the Snake and Clearwater rivers. Currently, due to flows below 50 kcfs, the project is operating in a 2-ft raised MOP range of 735.0-736.5 ft.

Ice Harbor is operating in the normal MOP range of 437.0-438.5 ft.

5. Lower Monumental Dam Operations - Doug Baus, Corps NWD

Doug Baus, Corps, brought TMT’s attention to an email he sent to TMT members on Friday, June 28, 2019. The email informed members that since the start of summer spill operations at Lower Monumental on June 21 at 0001 hours until June 28 at 1200 hours, the Corps was not spilling in accordance with the correct spill pattern due to human error. During this period the Corps was spilling in accordance with uniform spill patterns in the 2019 Fish Passage Plan (FPP) Table LMN-8 “Uniform Spill Patterns with RSW” when the Corps should have been spilling in accordance with bulk patterns in Table LMN-7 “Bulk Spill Patterns with RSW”. The Corps will continue spilling according to patterns per the 2019 FPP through the end of summer spill operations on August 31 at 2359 hours.

6. Next TMT

The next meeting will be face-to-face on July 17.

Today’s Attendees

Agency	TMT Representative
Army Corps of Engineers	Doug Baus (Chair), Julie Ammann, Lisa Wright
Bonneville Power Administration	Tony Norris, Scott Bettin
Bureau of Reclamation	Joel Fenolio
NOAA Fisheries	Paul Wagner, Claire McGrath
US Fish & Wildlife Service	Dave Swank
Washington	Charles Morrill
Oregon	Erick Van Dyke
Idaho	Russ Kiefer
Montana	Jim Litchfield
Nez Perce Tribe	Jay Hesse
Umatilla Tribe/CRITFC	Tom Lorz
Colville Tribe	Sheri Sears
Warm Springs Tribe	N/A
Kootenai Tribe	N/A
Spokane Tribe	N/A

Other Attendees (non-TMT members):

Army Corps of Engineers – Dan Turner, Jon Roberts, Alfredo Rodriguez, Alexis Mills, John Heitstuman, Laura Hamilton, Catherine Dudgeon, Aaron Marshall

BPA – Kim Johnson

DS Consulting – Emily Stranz (Facilitator), Colby Mills

FLUX Resources – Melissa Haskin (Note taker)

Columbia Basin Bulletin – Mike O’Bryant

Yakama Nation Fisheries – Tom Iverson

TMT – July 10, 2019

Member of the public – Charles Pace

NPCC – Leslie Bach

Lower Snake River Passage Summary for Spring 2019

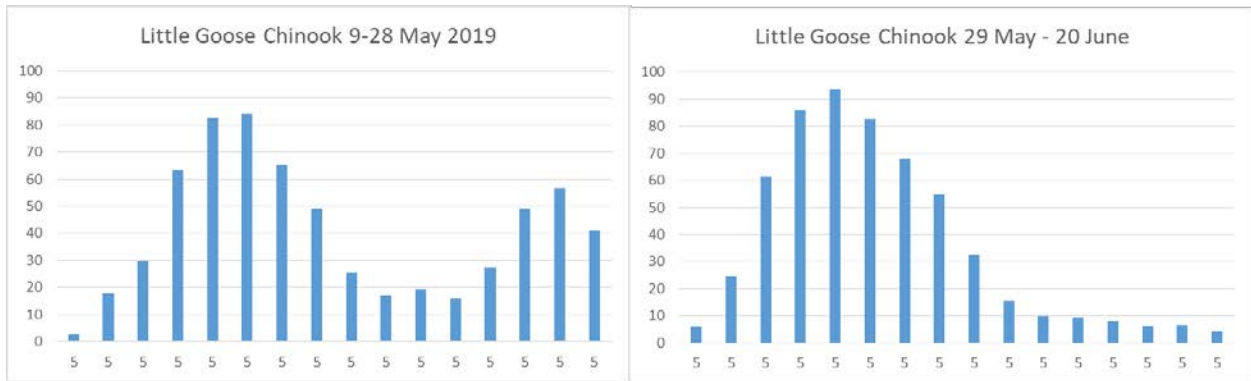
Updated 7/9/2019, C McGrath

Timing of 2019 LGS Operations

1. April 3 through May 24 (4:4 or 5:3 operation)
2. May 25 through May 28 (6:2 operation)
3. May 29 through June 5 (8:0 operation)
4. June 6 through June 12 (8:0 with ASW high crest partial hrs)
5. June 13 through June 20 (8:0 with ASW high crest 24 hrs)

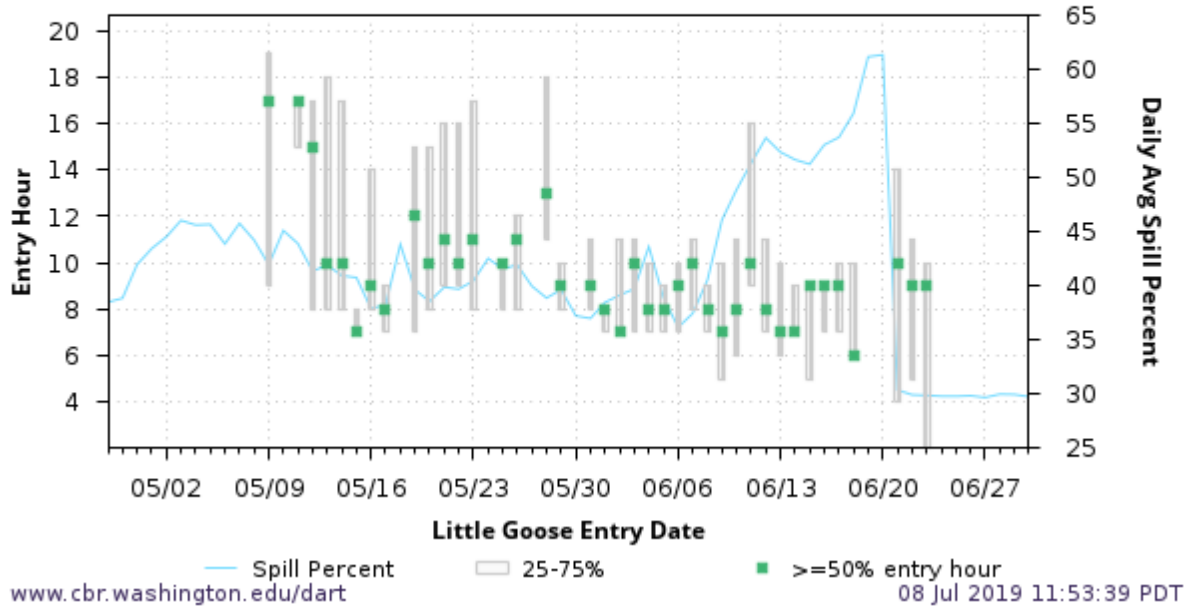
Daily Time of Ladder Entry at Little Goose

- Mean hourly Chinook salmon counts reflected the split flex spill pattern by producing a bimodal passage pattern for spring Chinook salmon at Little Goose Dam through May 28.
- After May 28, when performance spill occurred for an 8-hour block in the morning, the count pattern were unimodal with most passage occurring in the morning.



Graphs from C Peery, data from http://www.fpc.org/adults/adult_queries/Q_adultcoequeries_adultrunsum_queryv2.php

**Daily Distribution of Entry Hour, Little Goose
2019 Adult PIT Tagged All Spring Summer Chinook
Released at/above Lower Granite
Minimum 5 Entries/Day**



DART Passage Metrics

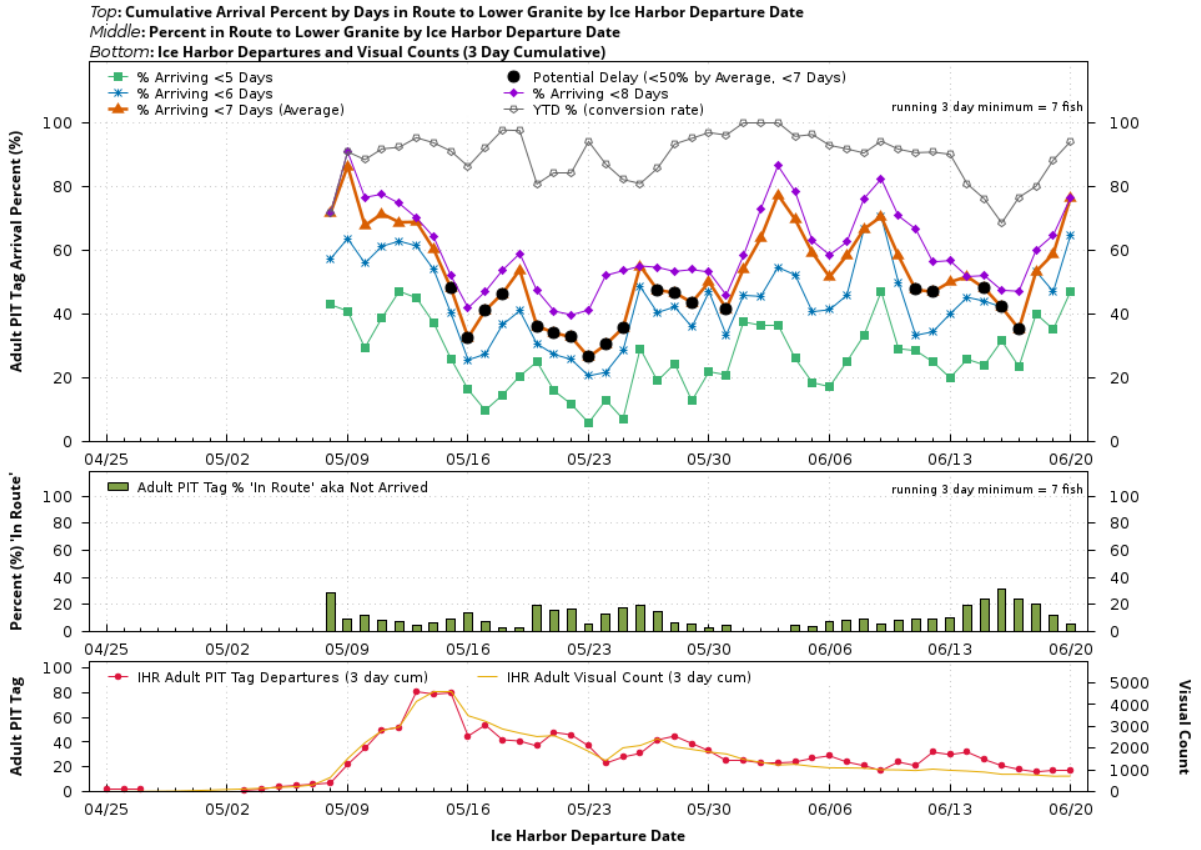
Ice Harbor to Lower Granite Conversion, through 7/9/19

- 2019 conversion YTD as of 7/9/2019 is 94.3 relative to a historical EOY conversion of 96.3 (range 93.3-98.0)
- DART's running 3-day tool indicated "potential delay" (slower than historical average travel time for 3-day cohort) on approximately half (44%) of dates between May 8 and June 20

ICH:LGR EOY conversion (2019 is YTD as of 7/9/2019)

Year	IHR Tag Count	LGR Tag Count	EOY Conversion
2019	474	447	94.3*
2018	666	645	96.8
2017	611	587	96.1
2016	1252	1212	96.8
2015	2327	2251	96.7
2014	1940	1899	97.9
2013	1388	1360	98.0
2012	1979	1903	96.2
2011	2819	2631	93.3
2010	4542	4364	96.1
2009	3366	3236	96.1
2008	2325	2260	97.2
2007	840	797	94.9
2006	454	435	95.8
Average	2006-2018		96.3

Running 3 Day - Ice Harbor to Lower Granite Travel Days and Run Size
2019 Adult PIT Tagged All Spring Summer Chinook Released at/above Lower Granite
Unique TagIDs Departing Ice Harbor (474) through 06/20
YTD Conversion Rate 94.3, YTD Harmonic Mean Travel Time 5.8



Lower Monumental to Little Goose Conversion, through 7/9/19

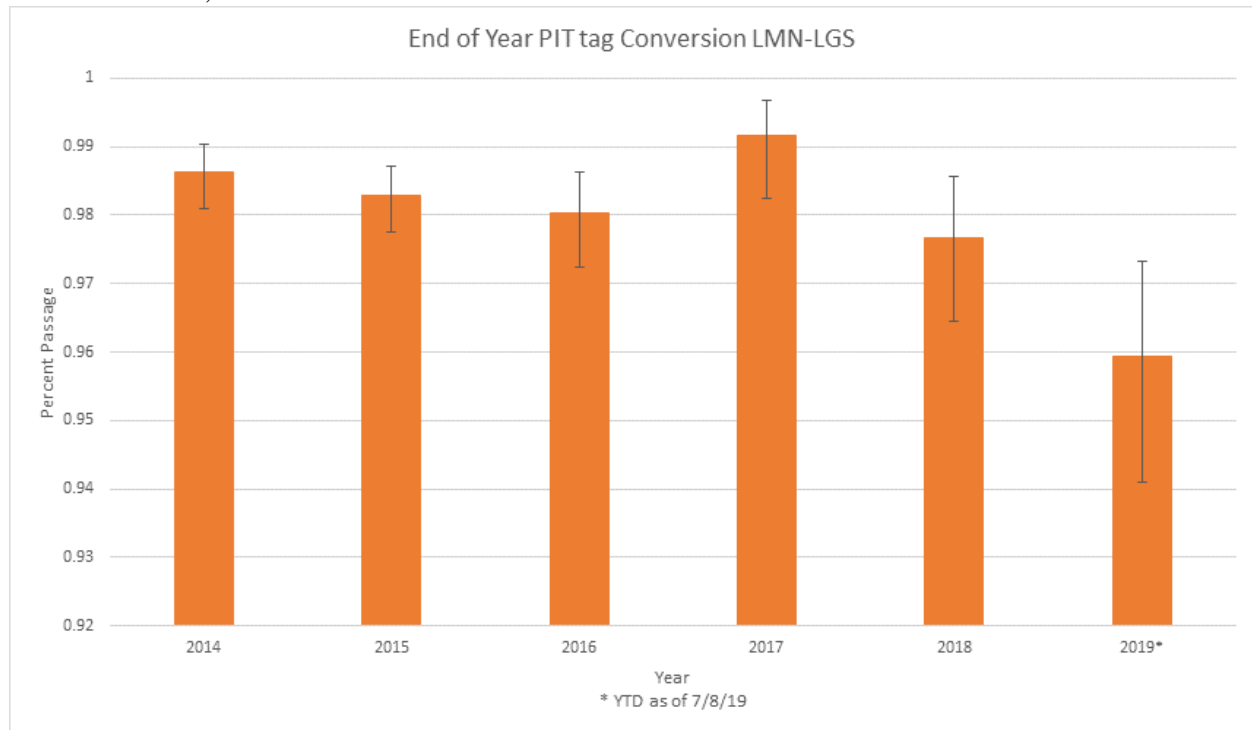
- 2019 conversion YTD as of 7/9/2019 is 96.2 relative to a historical EOY conversion of 98.3 (range 97.7-99.0)
- DART’s running 3-day tool indicated “potential delay” (slower than historical average travel time for 3-day cohort) on most (70%) dates between between May 9 and June 20
- Important to examine uncertainty around point estimates, e.g., incorporate information on how representative PIT tag data are of the population at large (Clopper-Pearson CI)
- In 2019 wild-origin had lower conversion than hatchery- warrants further analysis

LMN:LGS EOY conversion (2019 is YTD as of 7/9/2019)

Year	LMN Tag Count	LGS Tag Count	EOY Conversion
2019*	468	451	96.2*
2018	645	631	97.7
2017	598	593	99
2016	1216	1194	98
2015	2154	2119	98.3
2014	1898	1874	98.6
Average 2014-2018			98.3

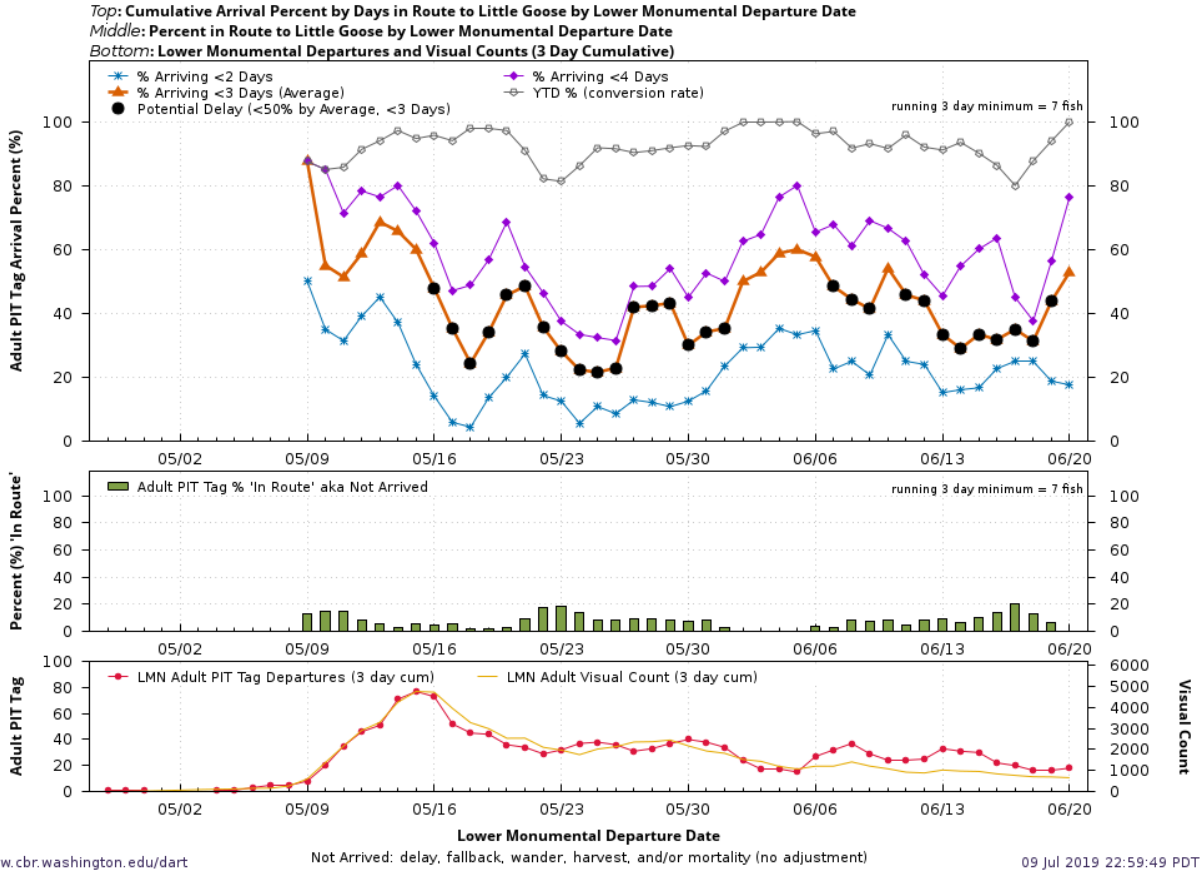
EOY PIT tag conversion with Binomial (Clopper-Pearson) Confidence Interval

From G Scheer, FPC



**Running 3 Day - Lower Monumental to Little Goose Travel Days and Run Size
2019 Adult PIT Tagged All Spring Summer Chinook Released at/above Lower Granite
Unique TagIDs Departing Lower Monumental (468) through 06/20**

YTD Conversion Rate 96.2, YTD Harmonic Mean Travel Time 2.2



LMN:LGS Wild versus Hatchery Conversion

PIT Tag Adult Chinook Returns Conversion Rate LMN to LGS, Observed at LMN April - June

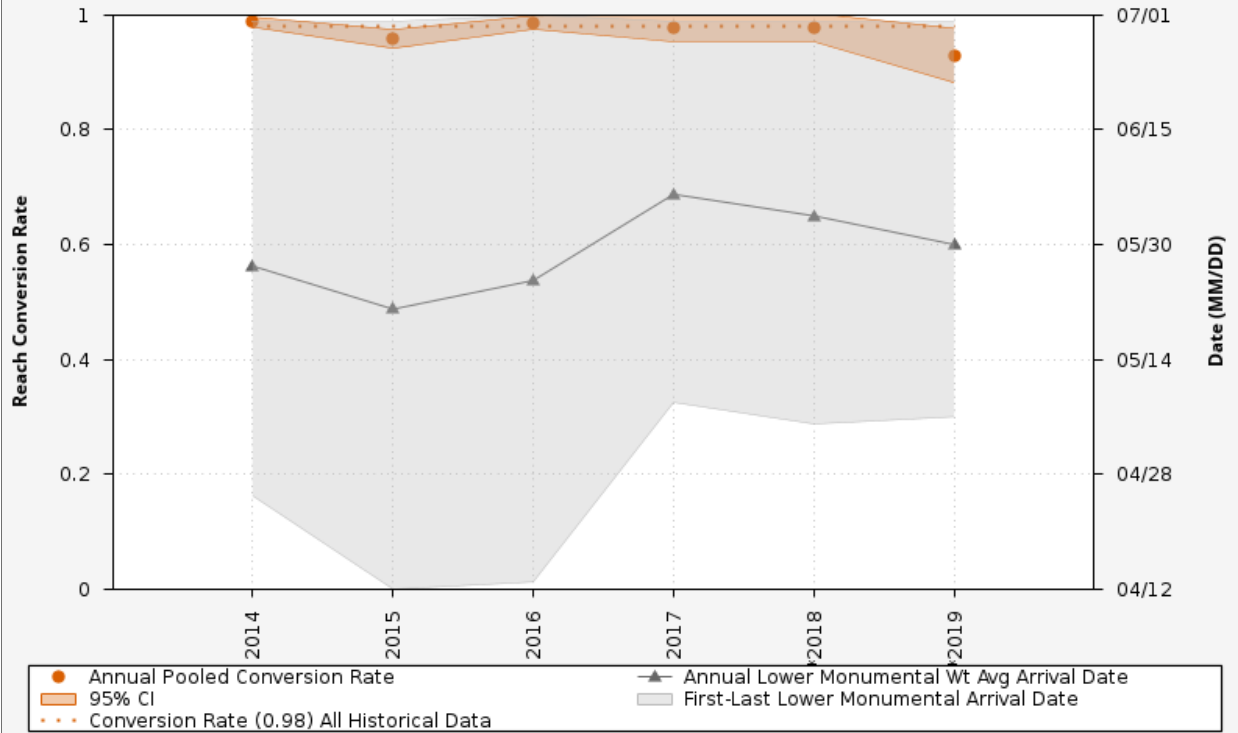
	Wild			Hatchery		
	LMN observations	LGS observations	Conversion Rate	LMN observations	LGS observations	Conversion Rate
2019	113	105	0.93	401	383	0.96
2018	139	136	0.98	595	579	0.97
2017	139	136	0.98	566	557	0.98
2016	373	368	0.99	1002	978	0.98
2015	573	549	0.96	1999	1906	0.95
2014	631	623	0.99	1608	1583	0.98

Annual Pooled Conversion Rates Lower Monumental to Little Goose

Adult PIT-Tagged Wild Chinook released in River KM 522.173:522.999

Observed at Lower Monumental, April-June

Potential Transport

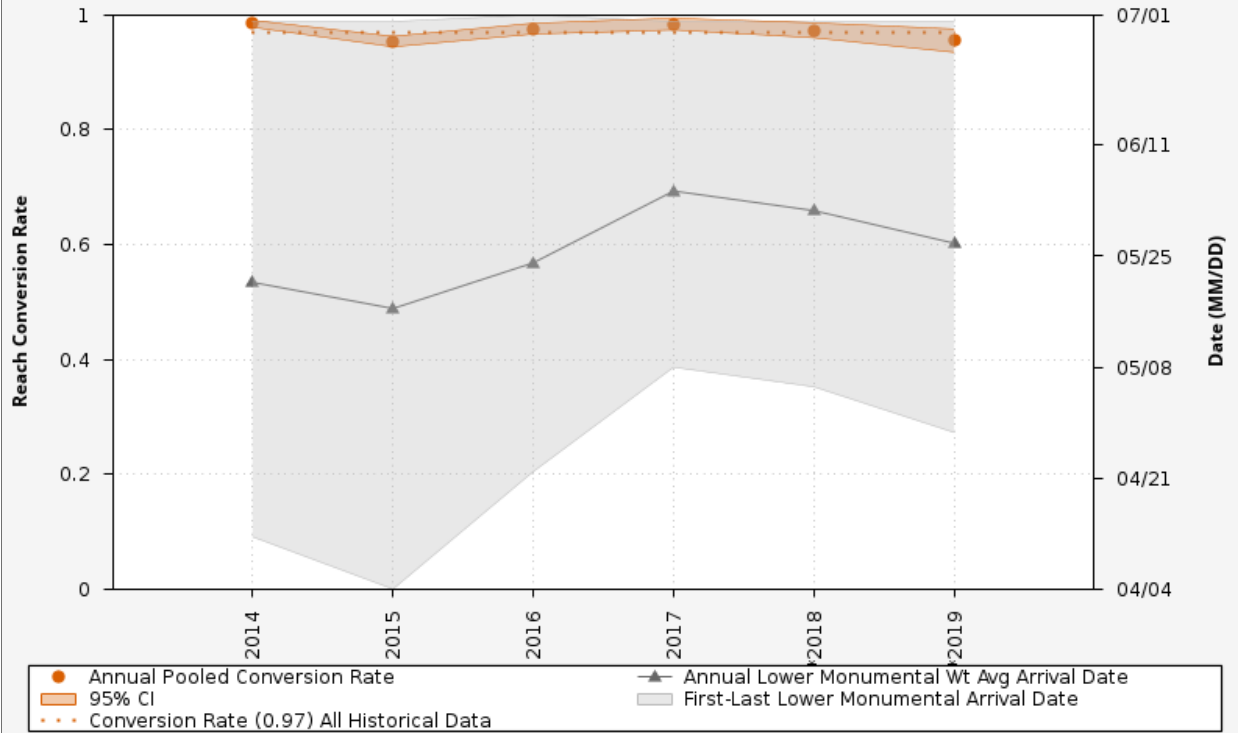


Annual Pooled Conversion Rates Lower Monumental to Little Goose

Adult PIT-Tagged Hatchery Chinook released in River KM 522.173:522.999

Observed at Lower Monumental, April-June

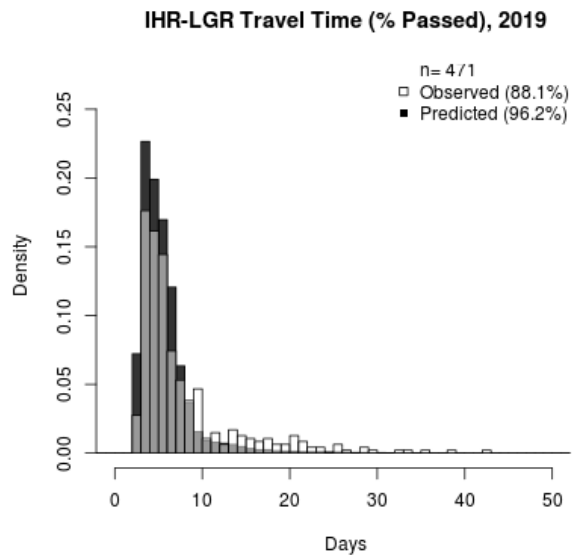
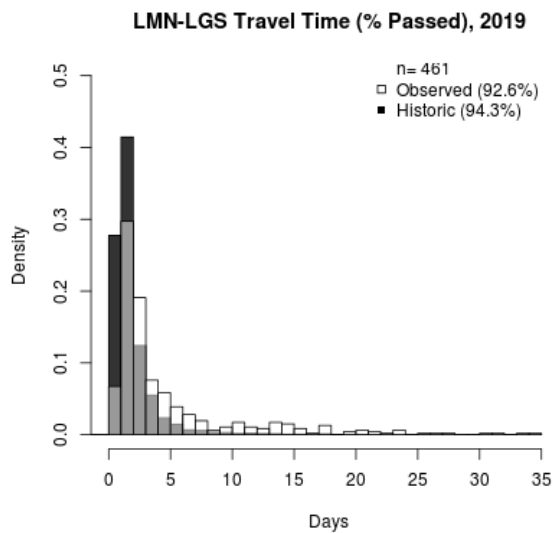
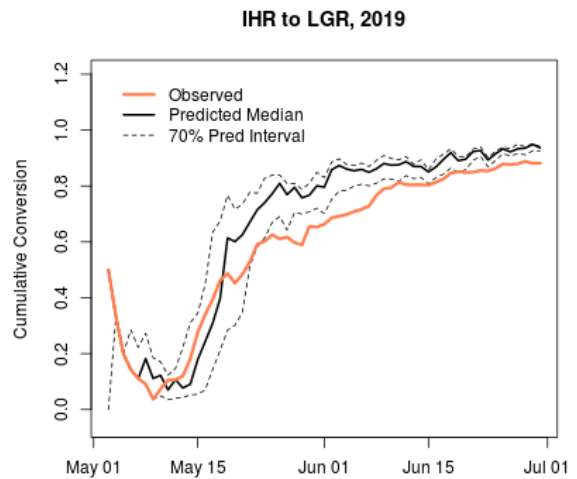
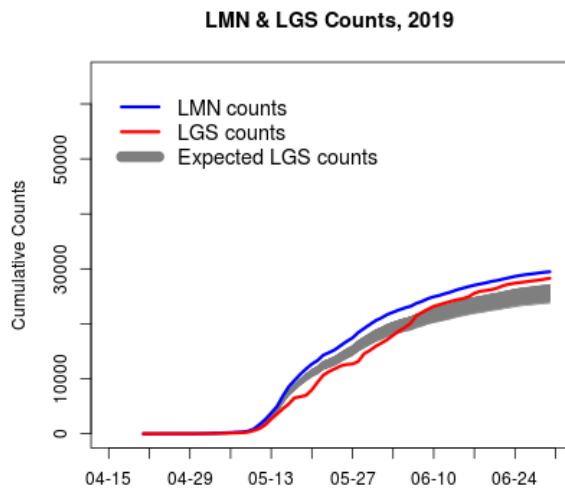
Potential Transport



FPC Passage Indicator, 5/3/19 - 6/30/19

Data from: http://www.fpc.org/passageindicator_homepage.php

- Accounts for flow conditions to determine expected convergence based on historical datasets
- Indicated lower convergence and longer-than-expected travel times between LMN and LGS for much of 2019 spring spill season
- Fallback likely accounts for most of the discrepancies between ladder counts (top left plot) and PIT tag convergence (top right)

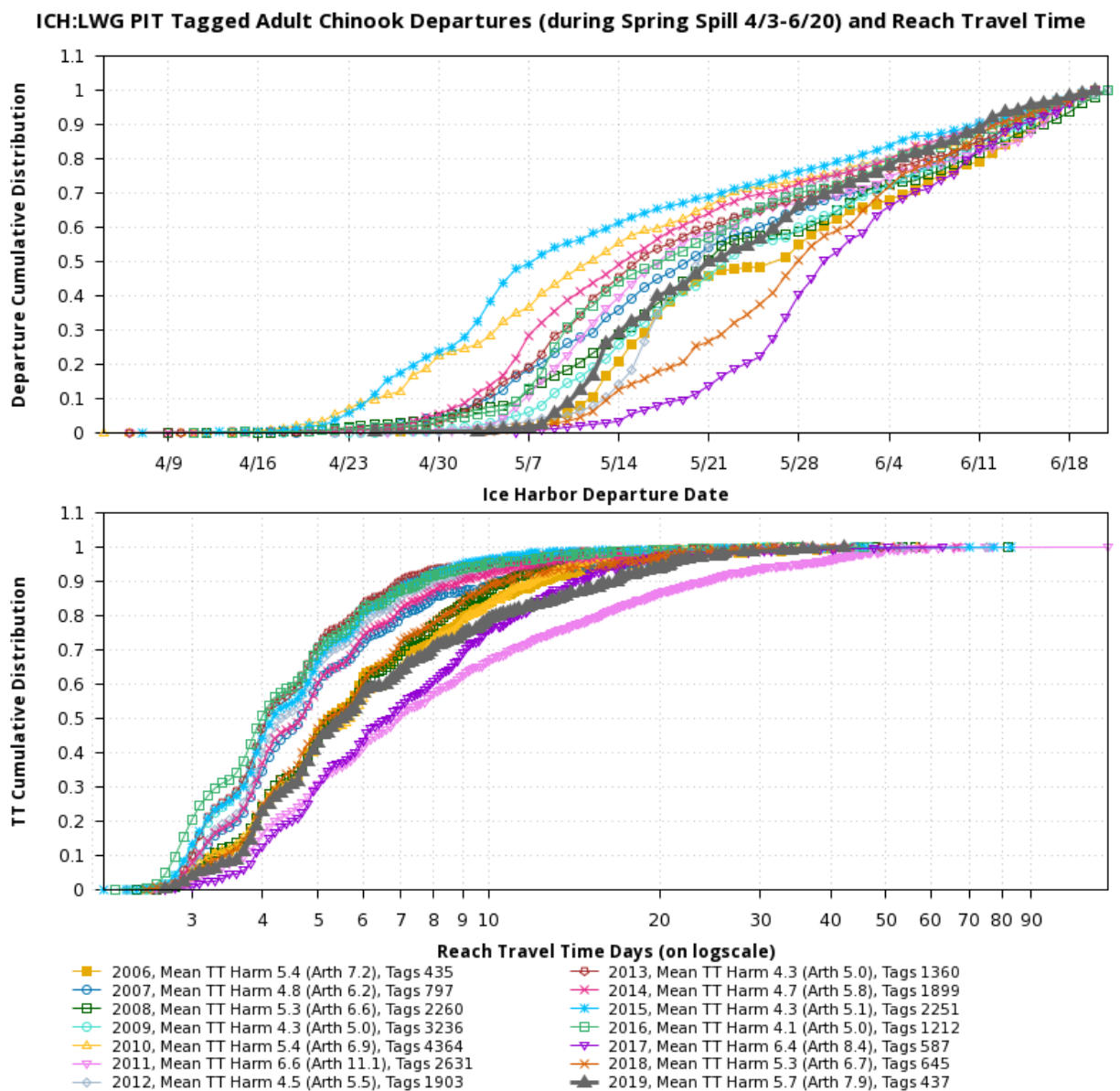


Run Timing, Reach Travel Times, and River Conditions

Data from DART (S. Iltis)

- These graphics provide visualization of run timing, travel times in various reaches, and river conditions for 2019 and prior years.
- Plotting cumulative distributions for travel time on a log scale was done simply to improve visualization of differences between years across the full range of travel times
- Harmonic and arithmetic means are provided for each year in the legend

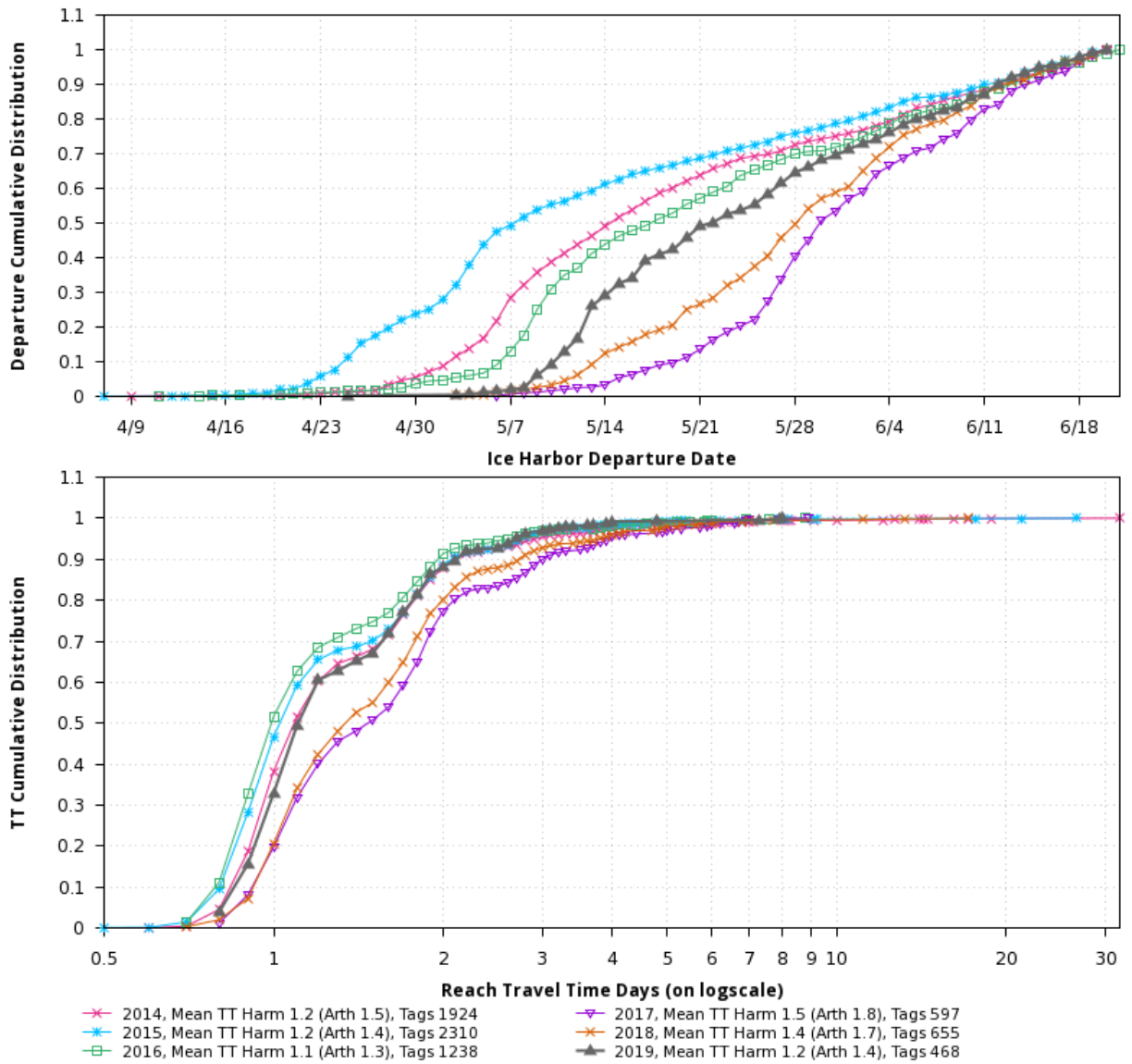
Ice Harbor to Lower Granite, through 7/1/2019



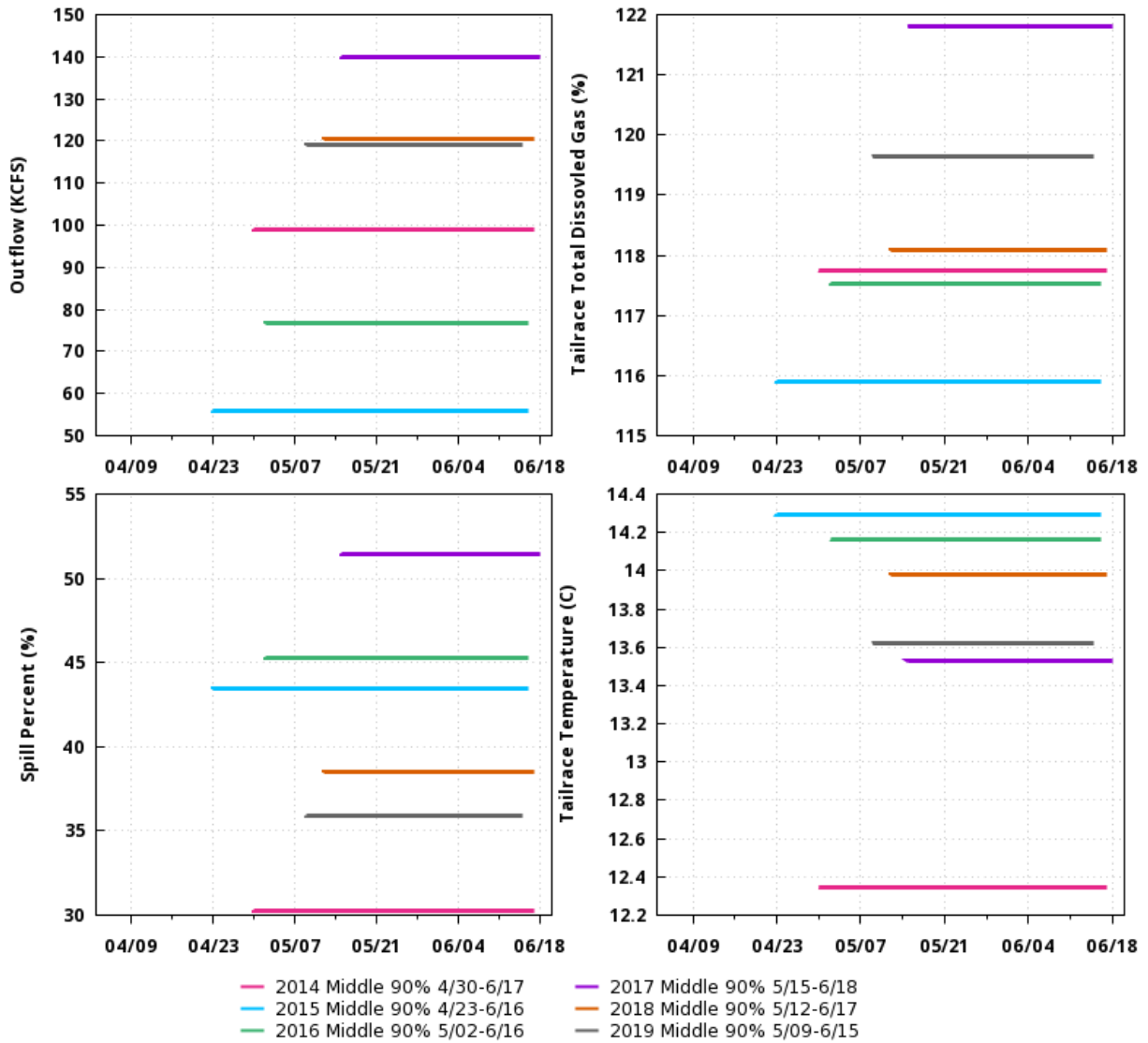
Ice Harbor to Lower Monumental

- 2019 data fell within the range observed in previous years for run timing, reach travel times, and river conditions.

ICH:LMN PIT Tagged Adult Chinook Departures (during Spring Spill 4/3-6/20) and Reach Travel Time



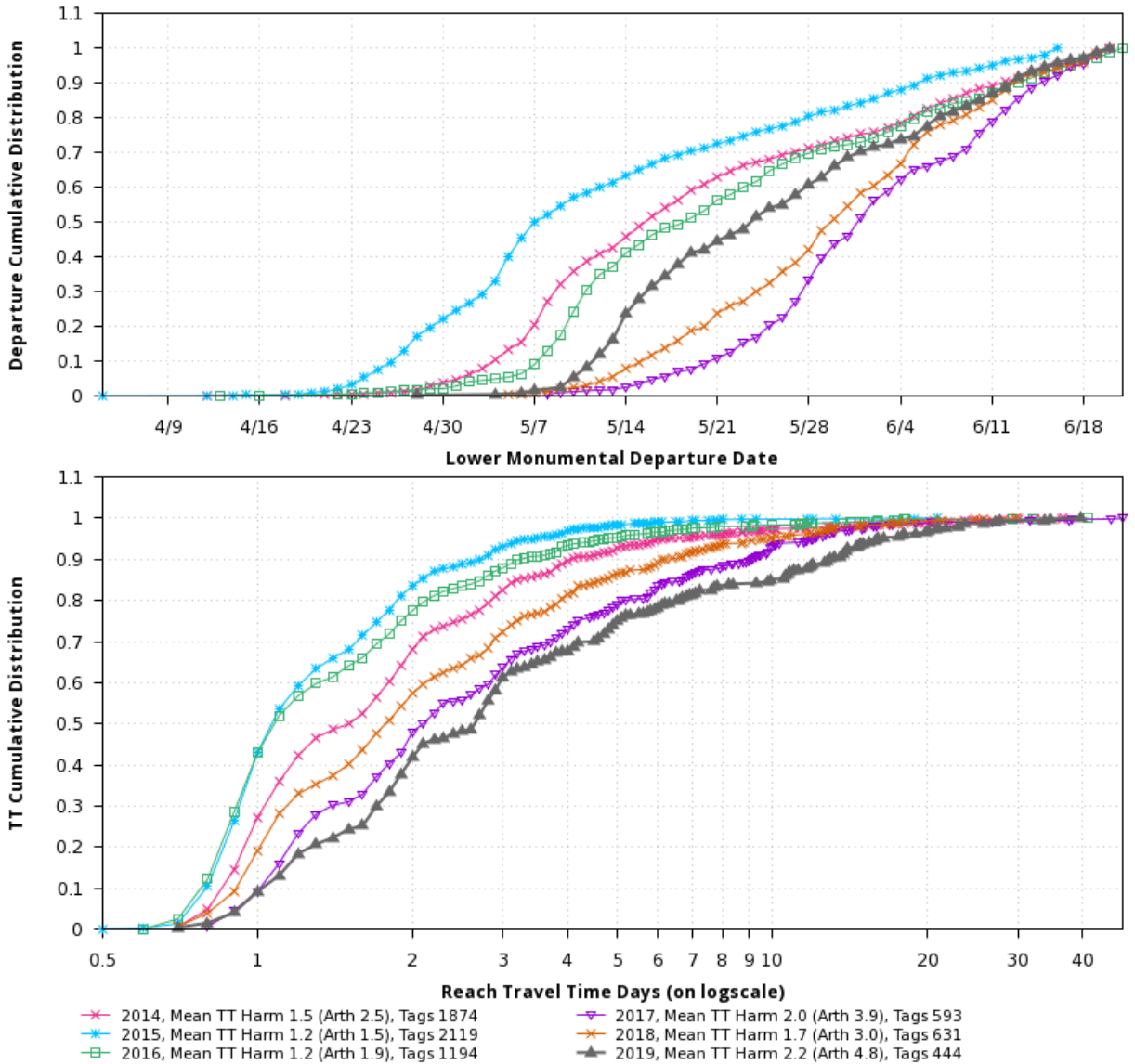
**River Conditions at Lower Monumental Averaged over Date Range
of Ice Harbor Middle 90% of Adult PIT Tagged Chinook during Spring Spill (4/3-6/20)**



Lower Monumental to Little Goose

- 2019 data fell within the range observed in previous years for run timing and some river conditions (average outflow, tailrace TDG, and tailrace temperature)
- 2019 had slower travel times and higher average spill percent than in previous years.

LMN:LGS PIT Tagged Adult Chinook Departures (during Spring Spill 4/3-6/20) and Reach Travel Time

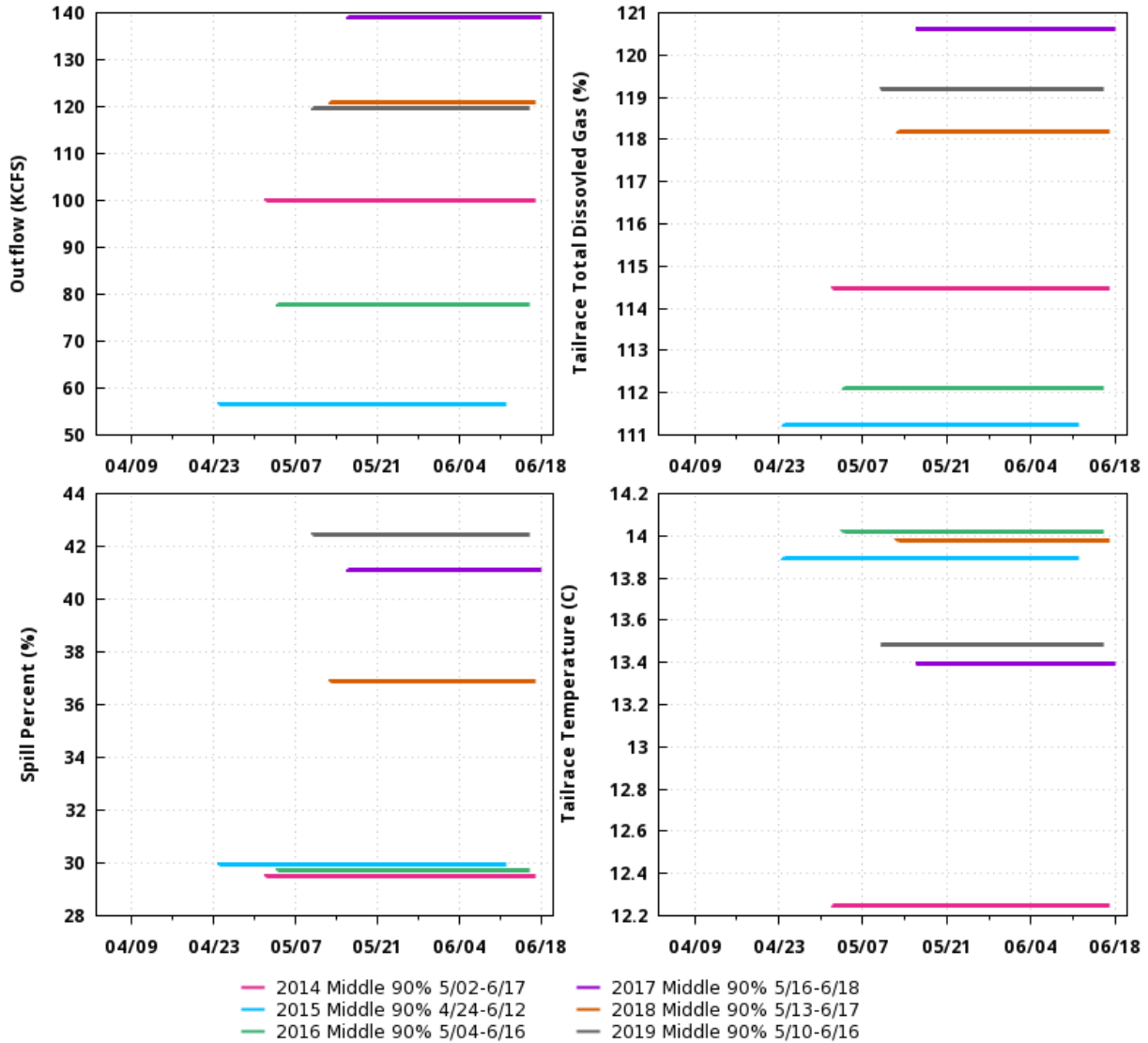


www.cbr.washington.edu/dart/

2019 data is incomplete (data through 7/1).

02 Jul 2019

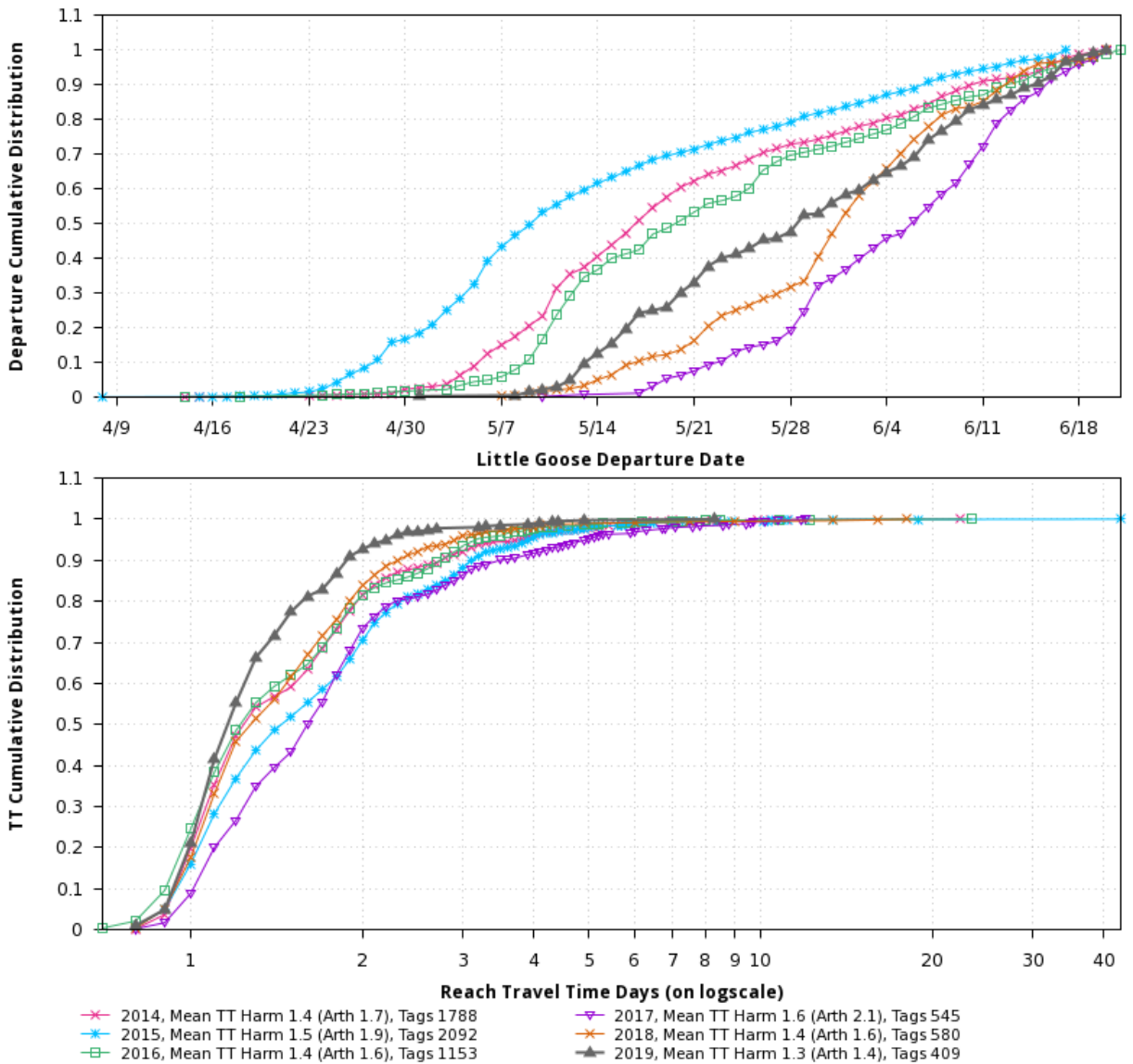
**River Conditions at Little Goose Averaged over Date Range
of Lower Monumental Middle 90% of Adult PIT Tagged Chinook during Spring Spill (4/3-6/20)**



Little Goose to Lower Granite

- 2019 data fell within the range observed in previous years for run timing, reach travel times, and river conditions.
- 2019 had faster travel times than in previous years.

LGS:LWG PIT Tagged Adult Chinook Departures (during Spring Spill 4/3-6/20) and Reach Travel Time

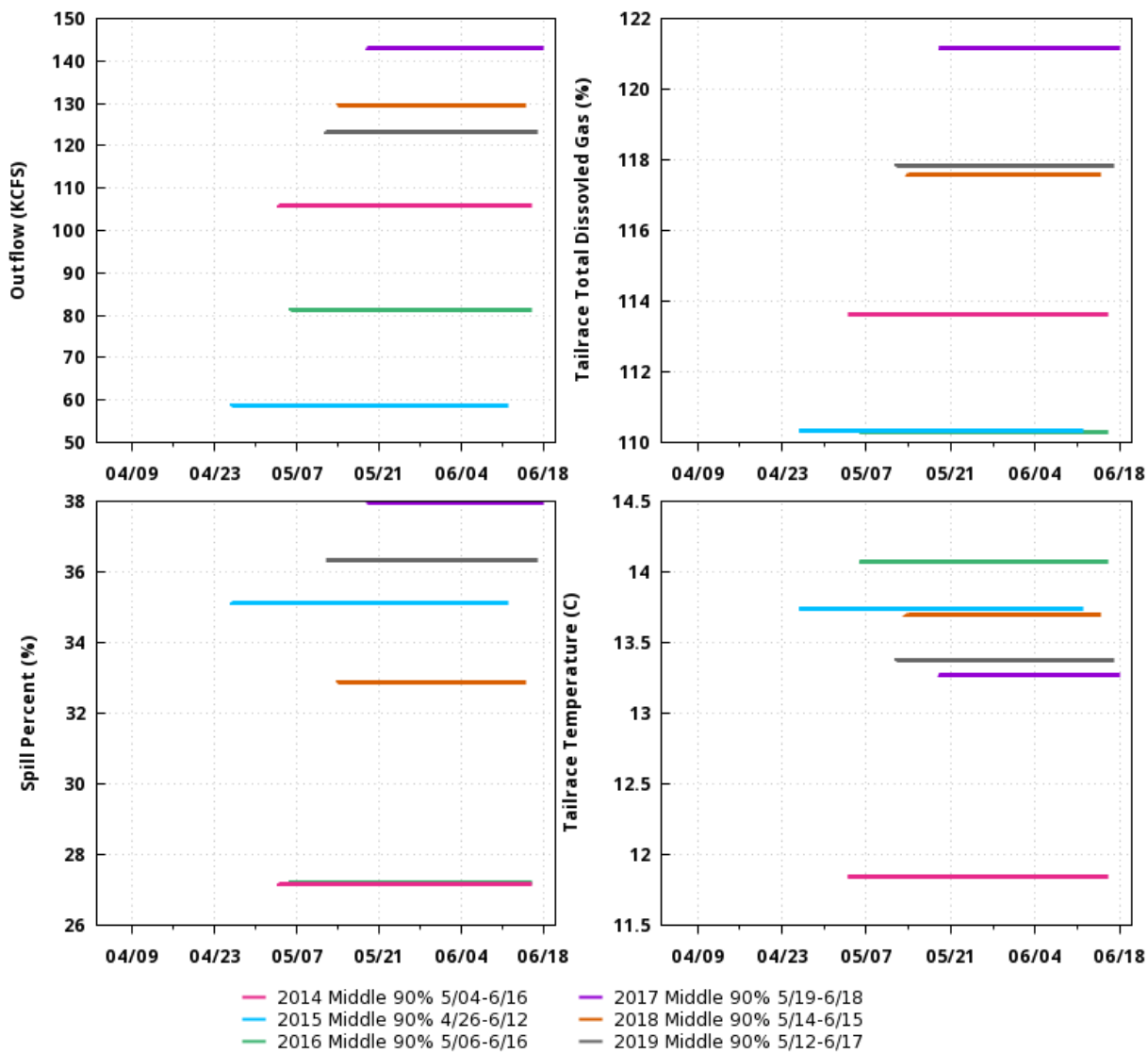


www.cbr.washington.edu/dart/

2019 data is incomplete (data through 7/1).

02 Jul 2019

**River Conditions at Lower Granite Averaged over Date Range
of Little Goose Middle 90% of Adult PIT Tagged Chinook during Spring Spill (4/3-6/20)**



2019 Fallback Rates

Data from: http://www.cbr.washington.edu/dart/query/pitadult_fallback

- Estimated fallback was higher at LGS than at other LSR projects in 2019
- Estimated fallback was higher in May than in June for all projects except LGR
- Historical fallback rates are highly variable at Little Goose. Estimated fallback at LGS in 2019 was within the range observed for spring Chinook in previous years.

Estimated Fallback Rates, LSR, 2019

	May 1 – 28	May 29 - June 20	2019 Average
Ice Harbor	7.3%	3.3%	5.4%
Lower Monumental	6.4%	2.8%	4.6%
Little Goose	13.3%	5.9%	9.6%
Lower Granite	6.9%	9.1%	8.1%

Estimated Fallback Rates for Spring Chinook, Snake River releases only, In-River and Transported Fish

	Ice Harbor	Lower Monumental	Little Goose	Lower Granite
2019	7.2	5.8	11.2	7.4
2018	4.4	7.8	10.5	8.8
2017	7.9	7.7	14.7	15.5
2016	3.9	4.2	3.1	2.9
2015	3.4	2.9	1.3	
2014	2.6	2.7	4.8	
2013	5.1			
2012	5.1			
2011	5.6			
2010	4.6			
2009	5.0			
2008	5.8			
2007	6.1			
2006	9.9			
Average	5.5	5.2	7.6	8.7

LGR Adult Trap Fish Injury Rates

- Concern was raised that jaw damage and head burn was being observed at “higher than normal” rates
- This is a perfunctory look at these data, more can be done to relate fish condition to river conditions, travel times, and other factors
- Jaw damage appears high (not much comparison data) and head burn appears within the range previously observed

Lower Granite Adult Trap, Spring Chinook (Mar 1 – Jun 17).

Year	% Jaw Damage	% Head Burn
2019	5.2	2.1
2018	1.2	2.9
2017		3.0
2016		3.5
2015		1.1
2014		1.6
2013		1.2
2012		1.6

